

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims

1. (Currently Amended) A linking apparatus which is connected to first and second networks of different line protocols for types of communication lines, and performs a packet relay between said first and second networks, comprising:

a first port connected to said first network for receiving a first packet from said first network, said first packet including two kinds of packets such that one kind of packet includes a first header of a line protocol of a higher layer than said line protocols of said first and second networks, a second header of the protocol of said first network, packet identification information and user data, the other kind of packet includes said second header, said packet identification information and said user data, but does not include said first header, the latter packet that includes no first header is a packet of a plurality of packets divided from one packet, said packet identification information being information having a same value for the packets divided from a same packet so as to provide information for determining whether packets are divided from a same packet or not;

a second port connected to said second network for sending a second packet to said second network;

a receiving section connected to said first port, said receiving section including a memory section storing at least one first header with being associated with packet identification information, determining whether said first packet includes the first header, and when the first header is included, storing in said memory section said packet identification information and first header of said first packet with said packet identification information and first header being associated with each other and outputting said first packet, and when the first header is not included, reading out from said memory section a first header, which is stored with being associated with a packet identification information having a same value as for the

packet identification information included in said first packet, among the first headers stored in said memory section to output said first packet to which said read-out first header is added; and

a sending section connected to said second port and said receiving section, said sending section receiving said first packet output from said receiving section, converting said first packet to said second packet, and outputting said second packet to said second port, said sending section adding a third header of the line protocol of said second network to said second packet based on the first header added to said first packet.

2. (Cancelled)

3. (Original) The linking apparatus according to claim 1, wherein
said receiving section determines whether a packet length of said first packet to which said first header is added is greater than a value of a maximum packet length defined for said second network, and when the packet length of said first packet is greater than the value of said maximum packet length, divides said first packet to two or more third packets to output the third packets; and

each of said third packets includes said first header, and a part of data included in said first packet.

4. (Currently Amended) The linking apparatus according to claim 3, wherein said sending section receives two or more said third packets output from said receiving section, converts said third packets to said second packets, and outputs said second packets to said second port, said sending section adding a third header of the line protocol of said second network to said second packet, based on the first header added to said first packet.

5. (Original) The linking apparatus according to claim 1, wherein said receiving section identifies sequence information included in said first packet, and determines whether said first packet includes said first header.

6. (Original) The linking apparatus according to claim 1, wherein
a format of said first packet differs from a format of said second packet;
said first packet has a second header including said packet identification information
and address information of said first network; and
said second packet has a third header including address information of said second
network.
7. (Original) The linking apparatus according to claim 6, wherein said sending
section generates said third header, and adds said generated third header to said first packet to
convert said first packet to said second packet.
8. (Currently Amended) The linking apparatus according to claim 6, wherein said
receiving section removes said second header from said first packet to ~~outputs~~output said first
packet.
9. (Original) The linking apparatus according to claim 1, wherein
said first network is a SAN;
said second network is a LAN; and
said first header is an IP header.
10. (Currently Amended) A linking apparatus which is connected to first and second
communication lines of different ~~types~~line protocols, and performs a packet relay between said
first and second communication lines, comprising:
a first port connected to said first communication line for receiving a first packet from
said first communication line, said first packet including two kinds of packets such that one
kind of packet includes a first header of a line protocol of a higher layer than said protocols of
said first and second communication lines, a second header of the protocol of said first
communication line, packet identification information and user data, the other kind of packet
includes said second header, said packet identification information and said user data, but does

not include said first header, the latter packet that includes no first header is a packet of a plurality of packets divided from one packet, said packet identification information being information having a same value for the packets divided from a same packet so as to provide information for determining whether the packet is divided from a same packet or not;

a second port connected to said second communication line for sending a second packet to said second communication line;

a receiving section connected to said first port, said receiving section having a memory section storing at least one first header with being associated with packet identification information, determining whether said first packet includes the first header, and when the first header is included, storing in said memory section said packet identification information and first header of said first packet with said packet identification information and first header being associated with each other and outputting said first packet, and when the first header is not included, reading out from said memory section a first header, which is stored with being associated with a packet identification information having a same value as for the packet identification information included in said first packet, among the first headers stored in said memory section to output said first packet to which said read-out first header is added; and

a sending section connected to said second port and said receiving section, said sending section receiving said first packet output from said receiving section, converting said first packet to said second packet, and outputting said second packet to said second port, said sending section adding a third header of the line protocol of said second communication line to said second packet based on the first header added to said first packet.

11. (Cancelled)

12. (Original) The linking apparatus according to claim 10, wherein

said receiving section determines whether a packet length of said first packet to which said first header is added is greater than a value of a maximum packet length defined for said second communication line, and when the packet length of said first packet is greater than the value of the maximum packet length, divides said first packet to two or more third packets to

output said third packets; and

each of said third packets includes said first header, and a part of data included in said first packet.

13. (Currently Amended) The linking apparatus according to claim 12, wherein said sending section receives two or more said third packets output from said receiving section, converts said third packets to said second packets, and outputs said second packets to said second port, said sending section adding a third header of the line protocol of said second communication line to said second packet based on the first header added to said first packet.

14. (Original) The linking apparatus according to claim 10, wherein said receiving section identifies sequence information included in said first packet, and determines whether said first packet includes said first header.

15. (Original) The linking apparatus according to claim 10, wherein
a format of said first packet differs from a format of said second packet;
said first packet has a second header including said packet identification information, and address information of said first communication line; and
said second packet has a third header including address information of said second communication line.

16. (Original) The linking apparatus according to claim 15, wherein said sending section generates said third header, and adds said generated third header to said first packet to convert said first packet to said second packet.

17. (Original) The linking apparatus according to claim 15, wherein said receiving section removes said second header from said first packet to output said first packet.

18. (Original) The linking apparatus according to claim 15, wherein

said first communication line is a Fibre Channel line;
said second communication line is an Ethernet line;
said first header is an IP header;
said second header is an FC header; and
said third header is an Ethernet header.

19. (Currently Amended) A linking apparatus which is connected to a SAN and a LAN, and relays a packet, which is sent from a device connected to the SAN, to a device connected to the LAN, comprising:

a first port connected to said SAN for receiving a first packet from said SAN, said first packet including two kinds of packets such that one kind of packet includes an IP header of a line protocol of a higher layer than line protocols of said SAN and LAN, a FC header of the line protocol of said SAN, packet identification information and user data, the other kind of packet includes said FC header, said packet identification information and said user data, but does not include said IP header, the latter packet that includes no IP header is a packet of a plurality of packets divided from one packet, said packet identification information being information having a same value for the packets divided from a same packet so as to provide information used for determining whether a packet is divided from a same packet or not;

a second port connected to said LAN for sending a second packet to said LAN, said second packet having a format different from a format of said first packet; and

a SAN process section connected to said first port for receiving said first packet received at said first port to ~~outputting-output~~ said first packet,

wherein said SAN process section, comprising:

a memory section;

an identification section for identifying whether said first packet includes an IP header;

a storing section for storing, when said first packet includes the IP header, in said memory section packet identification information, which is included in said first packet, after being associated with said IP header;

a header adding section for reading out, when said first packet does not include said IP

header, from said memory section said IP header, which is stored with being associated with packet identification information having a same value as for the packet identification information included in said first packet, among said IP headers stored in said memory section to add said IP header to said first packet; and

a LAN process section connected to said second port and said SAN process section, said LAN process section receiving said first packet output from said SAN process section, including a conversion section for converting said first packet to said second packet, and outputting said second packet to said second port, said LAN process section adding an Ethernet header of the line protocol of said LAN to said second packet based on the IP header added to said first packet.

20. (Currently Amended) The linking apparatus according to claim 19, wherein said SAN process section further comprises a dividing section for determining whether a packet length of said first packet to which said first header is added is greater than a value of a maximum packet length defined for said second network, and for dividing, when the packet length of said first packet is greater than the value of said maximum packet length, said first packet to two or more third packets to output said third packets; ~~and~~

said conversion section of said LAN process section receives two or more said third packets output from said SAN process section, and converts said third packets to said second packets; and

said SAN process section removes said FC header, said dividing section adds an IP header to each of the divided third packets and said conversion section adds the Ethernet header to said second packet based on the IP headers added to said first and third packets.